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RADIATION EFFECTS ON SILICON SOLAR CELLS

Eighth Monthly Progress Report Covering
the Period
October 1 - 31, 1962

Work done by:

S. K. Boehm
C. M. Faulkner
J. Harrity
H. Horiye
D. K. Nichols
V. A. J. van Lint
E. G. Wikner
M. E. Wyatt

Report written by:

V. A.J. van Lint

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This eighth monthly status report under Contract No. NAS7-91, Radiation Effects on Silicon Solar Cells, covers the period October 1 through October 31, 1962. During this period we have continued analysis of previous experiments on galvanomagnetic coefficients and lifetimes in irradiated silicon. Some new silicon material with nominally higher oxygen concentration has been secured and some galvanomagnetic and lifetime experiments have been performed with this new material. Samples have also been prepared for infrared spectroscopy. An analysis of the relation between mobility and concentration of ionized impurities has also been performed. In particular, the following specific irradiation experiments have been performed:

A sample of 7 ohm-cm quartz-crucible grown silicon was irradiated at room temperature with 30-Mev electrons. At various stages during the irradiation the electron beam was stopped and the temperature dependence of the Hall coefficient between 90°K and 295°K was determined. It was hoped that plots of $1/R_H e$ vs $1/T$ would reveal the energy levels being formed in the gap as in the theoretical curves of Fig. 1 in the third quarterly report.(1) However, although the sample received a total dose of 3.8×10^{15} electrons/cm^2, the steepest slope obtained was interpreted to correspond to an energy level of 0.05 ev and not the 0.16 ev level expected. The carrier removal rate as obtained from the room temperature Hall measurements was 0.129 cm^{-1}, while that taken from the 90°K measurements was 0.44 cm^{-1}.

A sample of 10 ohm-cm n-type floating-zone grown silicon and one of 10 ohm-cm p-type floating zone grown material were bombarded at 80°K in experiments in which lifetime measurements were made. These data are still being analyzed.

Three samples of 10 ohm-cm P-doped silicon and one of 15 ohm-cm As-doped silicon were irradiated with 30-Mev electrons at 80°K. The The $\Delta(1/R_H e)/\Delta\Phi$ were approximately -1.0 cm^{-1} for all and the $\Delta(1/\mu_N)/\Delta\Phi$ was 10×10^{-20} v-sec for the P-doped samples and 8.7×10^{-20} for the As-doped sample.

PERSONNEL

The following personnel participated in this research program

during this reporting period: S. K. Boehm, C. M. Faulkner, J. Harrity, H. Horiye, D. K. Nichols, V. A. J. van Lint, E. G. Wikner, and M. E. Wyatt.

REFERENCE

1. V. A. J. van Lint, General Atomic Report GACD-3560 (1962).